

REMARKS

The 10 December 2004 official action addressed claims 1-32. Claims 1-13 are canceled. Claim 14 is amended. Claim 15 is canceled.

Overview of amendments

Claims 1-13 were drawn to a non-elected invention and are canceled.

Claim 14 is amended to incorporate the feature of claim 15 and claim 15 is canceled.

Response to rejections**Claims 14-20**

Claims 14-18 were rejected as being anticipated by Felker (U.S. 6,508,948). Claim 19 was rejected as being obvious over Felker. Claims 14-20 were indicated to be obvious over Felker in view of Maa (U.S. 6,562,703), however it is believed that the official action intended to state only that claim 20 was rejected over Felker in view of Maa.

Applicant respectfully traverses the rejections. Claim 14 now requires the formation of a silicon on insulator (SOI) substrate in which a dielectric layer is formed on a silicon wafer, a layer of silicon carbide is formed on the dielectric layer, and a second dielectric layer is then bonded to the silicon carbide layer. Bonding is a process that is well-known in the art, in which separate wafers are placed in contact and subjected to heat treatment, such as in the method described in paragraph 0035 of the application. Felker teaches a technology for etching thin films. Felker states that the etching can be performed on wafers that are coated with various thin films that may include oxides and silicon carbide (col. 5, lines 3-5 and col. 6, line 65- col. 7, line 1). Felker does not provide any teaching or suggestion of a particular SOI substrate structure or a particular method of forming an SOI substrate, and does not teach the specific selection of a layer of silicon

carbide as an intermediate layer between two dielectric layers in an SOI substrate. Further, Felker does not teach the use of bonded layers. Felker's disclosure is focused on films, which are conventionally understood to be layers that are grown directly upon one another by deposition, as opposed to bonding in which layers are grown on separate structures and then bonded through direct contact and thermal treatment. Therefore it is believed that Felker does not anticipate claim 14 or its dependent claims. Claims 16-18 and 20 also recite features of the structures used in the bonding process and are also distinguished on this basis.

With regard to claim 20, Maa teaches the implantation of hydrogen into a silicon layer in order to relax an overlying silicon germanium layer. Maa does not teach the implantation of hydrogen followed by thermal treatment that causes the substrate to fracture in the hydrogen implanted region. Therefore claim 20 is distinguished on this additional basis.

Claims 21-26

Claims 21-26 were rejected as being obvious over Felker in view of Hu (U.S. 6,413,802).

Applicant respectfully traverses the rejection. Claim 21 specifies the formation of a FinFET on an SOI substrate that has a layer of silicon carbide beneath a dielectric layer and a semiconductor layer on the dielectric layer. As discussed above, Felker does not provide any teaching or suggestion of a particular SOI substrate structure or a particular method of forming an SOI substrate, and does not teach the specific selection of a layer of silicon carbide as a layer beneath a dielectric layer in an SOI substrate. A person of ordinary skill who is implementing an SOI device and who reads Felker would not be led to implement the SOI substrate in the manner claimed because Felker provides no suggestion as to how SOI substrates should be implemented and no particular teaching of an SOI layer structure specifically having semiconductor on top of dielectric on top of silicon carbide. Therefore applicant believes that claim 21 and its dependent claims 22-26 are distinguished on this basis.

Claim 24 specifies that the structure formed includes strained silicon. The official action states that the use of strained silicon is taught by Hu at col. 4, line 35 and col. 5, lines 2-6. Applicant finds no teaching of strained silicon anywhere in Hu. The cited portions of Hu discuss selective epitaxial growth of silicon. Strained silicon is silicon grown on another crystalline material having a lattice constant that is sufficiently different from the silicon lattice to apply a tensile or compressive strain to the silicon lattice. This technology is not discussed anywhere in Hu or Felker, and so claim 24 is distinguished on this additional basis.

Claim 25 specifies the additional feature that the upper dielectric layer of the SOI substrate is bonded to the silicon carbide layer. As discussed above, this feature is not taught by Felker. It is also not taught by Hu, and so claim 25 is distinguished on this additional basis.

Claims 27-32

Claims 27-32 were rejected as being obvious over Felker in view of White (U.S. 6,130,102).

Applicant respectfully traverses the rejection. Claim 27 specifies the formation of a MOSFET in a region on an SOI substrate that is defined by forming shallow trench isolations around the region. The official action cites White as teaching a substrate including a dielectric layer 18, a semiconductor layer 20, and a dielectric layer 28. Applicant respectfully submits that White is misapplied. The claim specifies "a silicon carbide layer, a dielectric layer formed on the silicon carbide layer, and a layer of a semiconductor material formed on the dielectric layer," not a semiconductor layer between two dielectric layers. Further, White's substrate is indicated by reference number 12. The structures cited by the official action as constituting White's substrate are the gate dielectric 18, gate electrode 20 and interlevel dielectric 22. These are not part of the substrate, rather they are components of a MOSFET formed on the substrate (18, 20) and a protective layer that covers the MOSFET (28). These features are more properly compared to the claimed MOSFET rather than to the underlying substrate. White uses a simple

silicon substrate 12 that would not be considered an SOI substrate by those of ordinary skill in the art. The official action cites Felker as teaching the addition of a silicon carbide layer to White, but as discussed above there are other features missing from White that Felker does not supply. Further, as discussed above, Felker does not provide any teaching or suggestion of a particular SOI substrate structure or a particular method of forming an SOI substrate, and does not specifically teach the required SOI substrate layer structure. Therefore applicant submits that the claim 27 and its dependent claims 28-32 are distinguished on this basis.

Claim 31 specifies the additional feature that the upper dielectric layer of the SOI substrate is bonded to the silicon carbide layer. As discussed above, this feature is not taught by Felker. It is also not taught by White, and so claim 31 is distinguished on this additional basis.

The foregoing amendments and remarks address all bases for objection and rejection and are believed to place the case in condition for allowance. The examiner is invited to contact the undersigned to resolve any remaining issues.

Respectfully submitted,

Date: 10 March 2005

By Ronald Coslick

FOLEY & LARDNER LLP
Customer Number 23392
Telephone 310 975 7964
Fax 310 557 8475

Ronald Coslick
Attorney for Applicant
Registration No. 36,489